REMARKS

First, Applicants note that a certified copy of EPO 00111542.7 is submitted herewith to perfect applicants' foreign priority under 35 U.S.C. § 119(b). An acknowledgement of this submission would be appreciated.

Claims 22-31 are cancelled herein while new claims 32-39 have been added. Thus, claims 1-21, of which claim 16 is currently amended, and new claims 32-39 appear in this application for the Examiner's review and consideration. The specific changes to claim 16 are detailed herein, and are supported by both the original claims and the specification. New claims 32-39 are supported by the specification and original claims 11, 12 and 14-17. As no new matter has been introduced, Applicants respectfully request that amended claim 16 and new claims 32-39 be entered into the application at this time.

Claim Rejections -- 35 U.S.C. § 112

Claims 3 and 16 are rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the applicants regard as the invention.

In particular, the Examiner states that reciting "cereals" renders claim 3 vague and indefinite because it is unclear how a cereal is a plant. Applicants respectfully request reconsideration of this statement. Rather than to denote a food prepared from commercially processed grains as in claim 15, "cereals" is recited in claim 3 for its primary dictionary definition, which is: grass such as wheat, oats, or corn, the grains of which are used as food; the grain of such grass; and any of several other plants or their edible seed or fruit, such as buckwheat or grain amaranth. The specification further supports that the word "cereals" means grass and grains in this context (see page 4, lines 25-26 of the specification (reciting rice bran, barley, wheat, rye and oats)), and a cereal clearly is a plant under this definition. Hence, reciting "cereals" does not render claim 3 vague and indefinite, and this claim rejection should be withdrawn.

The Examiner also states that it is unclear what is part of the Markush group in claim 16. In response, the claim is amended for clarification as the Examiner suggested, and this rejection should also be withdrawn.

Claim Rejections -- 35 U.S.C. § 102

Claims 1-14, 16, and 18-21 are rejected under 35 U.S.C. § 102(b) as being anticipated by Fujiwara *et al.* (U.S. Patent No. 5,705,526 A). Fujiwara teaches a hypocholesterolemic agent in the form of a soft capsule, comprising gelatin and glycerin for the capsule and a mixture of lycopene, other carotenoids, a wheat germ oil, and a vegetable oil such as soybean oil. Lycopene may also be formulated into a tablet or powder and may further contain emulsifiers, stabilizers, coating agents, and/or solvents.

The present invention relates to a primary composition comprising at least one lipophilic bioactive compound (LBC) and a whey protein in an amount effective to increase the bioavailability of the lipophilic bioactive compound. Whey protein, which is not even mentioned in Fujiwara, is an essential component of the present invention and present claims. The Examiner likens whey protein to soybean oil, but these are two distinct and different compounds, used for different purposes. Whey protein, or *serum lactis*, comes from the watery part of milk that separates from the curd, as in the process of making cheese, left over after butterfat, casein and albumin are removed. (See attached pagre from Food Chemistry textbook by H.D. Berlitz and W. Grosch). Whey protein is used in the present invention to increase bioavailability of the compound. In contrast, soybean oil, a vegetable oil, is used in Fujiwara to improve fluidity of the contents of the soft-capsulated drug (col. 4, lines 20-24) and does not contribute to bioavailability of lycopene in the drug.

Hence, the present invention is not anticipated by the prior art, because the prior art is directed only to delivering a hypercholesterolemia therapeutic agent containing lycopene while the present invention relates to LBC-containing products with increased bioavailability of the LBC. Fujiwara does not disclose, teach or suggest increasing bioavailbility of lycopene or any LBC by adding a whey protein, which is the aim of the present invention. Since the present claims are not anticipated or rendered obvious to one of ordinary skill in the art who is familiar with Fujiwara, this rejection should be withdrawn.

The Examiner also rejects claims 1-8, 10-16, and 18-21 under § 102(b) as being anticipated by Potter *et al.* (U.S. Patent No. 5,855,892 A). Potter relates to a method of altering the concentration of cholesterol constituents in human blood by administering a daidzein material. The daidzein material may be administered in a pharmaceutical composition or in a dietary supplement, including soy protein-based dietary supplements. Potter discloses that daidzein is isolated from a soy material, including soy beans, dehulled soy beans, soy

meal, soy flour, soy grits, soy flakes (full fat and defatted), soy molasses, soy protein concentrates, soy whey, soy whey protein, and soy protein isolate (col. 3, line 60 to col. 4, line 16), and that a daidzein-rich soy protein material can be formed by producing a protein isolate from defatted soy flake such that the loss of daidzein from the protein isolate is minimized or by converting daidzin and daidzein isoflavone conjugates to daidzein in a soy protein concentrate or in a soy whey protein material (col. 6, lines 31-63).

Thus, while Potter teaches a composition comprising daidzein and a soy whey protein material, it makes no mention of whey protein. Although the inclusion of the word "whey" in "soy whey protein" may be misleading, a person skilled in the art would immediately understand that a "soy whey protein" is a soy protein concentrate or isolate, different from a whey protein according to the present invention, which as noted above is a milk byproduct and of dairy origin. Potter, therefore, does not teach, disclose or suggest combining daidzein with whey protein, an important and novel feature of the present invention that enables increased bioavailability.

Moreover, the present compositions significantly differ from the Potter composition in that the lipophilic compound in Potter is isolated from soy, rather than being added exogenously. The ratio of daidzein to soy protein by weight further emphasizes the difference between the Potter composition and the present invention. As stated for Formulations 5-8 in Potter, which illustrate dietary supplements that may be formed using an isolated soy protein rich in daidzein, the daidzein-rich isolated soy protein typically contains between about 1 to 3 milligrams of daidzein per gram of soy protein. The weight ratio of daidzein to soy protein in Potter is thus 1:1,000 to 3:1,000, far from that of whey protein to LBC in the present invention, and certainly not an amount effective to increase the bioavailability of the LBC. In fact, the present invention discloses that "the whey protein and lipophilic bioactive compound may be present in a weight ratio of at least about 1:1 to 500:1, preferably from about 1.5:1 to 250:1 and more preferably about 2:1 to 20:1." (specification, page 6, lines 14-18; claim 12).

Hence, the present invention is not anticipated by Potter, which makes no mention of bioavailability enhancement of the LBC, isolates daidzein from soy protein instead of adding exogenously, and uses a weight ratio of components that is so far removed from the present invention that it represents completely different materials. Again, the rejection is clearly in error at least as to claim 12. The claim rejections over Potter should therefore be withdrawn.

The Examiner rejects claims 1-10, 13-14, 16, and 18-21 under § 102(b) as being anticipated by Schmitz *et al.* (U.S. Patent No. 5,643,623 A). Schmitz teaches a health food product containing a first component in the form of a discrete portion from a second component. The first component includes an antioxidant mixture containing a blend of antioxidants selected from carotenoids, vitamins C and E, and curcumin. Internalization and integration of the above nutrients within a lipid-containing core of the food product facilitates absorption of the fat-soluble components in the gastrointestinal tract following consumption, increases shelf-life and minimizes degradation of these labile compounds by minimizing exposure to heat, light and/or oxygen, and prevents disadvantageous yellow/orange coloration of the outer material of the food product.

The Examiner states that Schmitz teaches food product compositions comprising lycopene, vitamins C and E, whey protein, flavors, and colors in the form of solid, gel or liquid, citing Example 6, which discloses that whey protein may be included as carrier in the first or second component. As shown in the example, the first component contains 10-20% of whey protein which is used as carrier in the lipid-containing core and 0.1-1% carotenoid blend (the lipophilic compound). The second component contains only carrier compounds and no LBC, as specified in the description ("The second component comprises a carbohydrate and/or fat and/or protein, and advantageously other nutritive and non-nutritive compounds" (col. 2, line 66 to col. 3, line 1)). Hence, the Schmitz composition is in an encapsulated form and therefore is heterogeneous, contrary to the present invention, wherein the composition is a homogenous mixture. Rather than being in a discrete form as in Schmitz, the LBC is distributed uniformly in the protein matrix/network in the present invention. It should also be noted that Schmitz urges one skilled in the art to use a lipid-containing core and does not teach that the lipid core may be replaced by whey protein as a matrix.

Furthermore, Schmitz does not disclose, teach or suggest enhancing bioavailability of the carotenoid blend, but contemplates using whey protein merely as a carrier. Schmitz specifies that the antioxidants are preferably localized in a lipid-based carrier within the food product to promote absorption and digestion of the carotenoid blend and curcumin (col. 3, lines 19-22). Whey protein is cited in Schmitz only as an example of different kinds of proteins that can be used as carrier, and its important function related to bioavailability is not recognized. Accordingly, Applicants respectfully request that the claim rejection be withdrawn.

Claims 1-7, 9-13, and 20-21 are rejected under 35 U.S.C. §§ 102(a) and 102(e) as being anticipated by Collins *et al.* (U.S. Patent No. 6,203,805 B1). Collins relates to pharmaceutical or cosmetic compositions for topical application to the skin comprising a collagen enhancing effective amounts of whey protein, vitamin A, vitamin E and vitamin C in combination with each other.

Collins teaches a synergistic combination that enhances the stimulation of collagen synthesis, for which there had previously been a research involving a peptide in the form of a hydrolysate, obtained from fermentation of milk proteins. Specifically, Collins discloses that when vitamins C and E are combined in specific ranges of amounts with whey protein and vitamin A, an inverse relationship is found between quantities specific to vitamin C and vitamin E with respect to increasing the production of collagen. Collagen production is maximized using higher quantities specific to vitamin E and lower quantities specific to vitamin C and, conversely, using lower quantities specific to vitamin E and higher quantities specific to vitamin C, within certain defined ranges. For example, while whey protein alone increased collagen synthesis by 85 percent, the composition was shown to be capable of boosting the synthesis of collagen greater than about 300 percent when vitamins C and E components were present in specific ranges. However, there was a decrease in collagen synthesis when vitamin C is doubled (from 50 μg/ml to 100 μg/ml) in the presence of a high level of vitamin E (1,000 μg/ml).

Thus, what Collins teaches is that collagen synthesis can be enhanced by using whey protein and vitamin A, in combination with vitamins C and E in specific ranges based on their inverse effect in boosting collagen synthesis. The vitamins enhance the collagen-stimulating property of whey protein, but only if they are used in certain limited amounts in relation to each other. Hence, the Collins composition does not teach how whey protein can enhance the bioavailability of a LBC, and a skilled artisan would not consider the present invention to be anticipated by a disclosure that relates to how certain vitamins in certain amounts can boost the collagen-stimulating ability of whey protein.

In addition, as the Examiner points out, the whey protein is present in the Collins composition in the amounts of 50-10,000 μg/ml, which correspond to 0.005-1% by weight. Such is not an amount that is effective to increase the bioavailability of the LBC. In the present invention, whey protein represents at least 5% and up to 90% of the composition to

enhance the bioavailability of the LBC (specification, page 6, lines 13-14). Accordingly, Applicants respectfully request the rejection be withdrawn.

Claims 1-7, 11-14, and 18-21 are rejected under § 102(b) as being anticipated by Rosenberg (U.S. Patent No. 5,601,760), which describes a milk derived whey protein-based microencapsulating agents and a method for microencapsulation of volatile or non-volatile core materials in a wall system consisting essentially of a whey protein. Whey protein-microencapsulated cores are easy to handle and store, have higher stability, protect the encapsulated core from deteriorating factors, prevent evaporation of volatile cores, transform liquid cores into free flowing powders, and provide greater versatility of microencapsulated products.

The term "core" is used to mean any active ingredient or material submitted to microencapsulation by whey proteins, with examples including fats such as anhydrous milk fat, volatiles, essential oils, flavors, fragrances, nutritional compounds, health products, vitamins, oleoresins, bacteria, enzyme, minerals, natural colorants, oils, essences, pharmaceuticals, and pharmaceutically acceptable ingredient, or a mixture thereof. The concentration (load) of cores used for microencapsulation depends on the active ingredient and typically ranges from about 5% to 95% by weight of the dry wall solids. The wall system of the Rosenberg invention is formed by milk derived whey protein isolate or whey protein concentrates alone or in combination with milk derived or non-milk derived carbohydrates.

In Example 6, Rosenberg teaches a composition that contains a certain amount of whey protein in the wall system and a certain amount of molecules to be encapsulated in the core, which is, more specifically, a composition comprising 35-80% whey protein and 10-75% vitamin A. Similar to the Schmitz composition, the composition in Rosenberg is in an encapsulated form and is heterogeneous, unlike the present invention, in which the composition is a homogeneous mixture. Instead of being in discrete encapsulated forms, the LBC is distributed uniformly in the protein matrix/network in the present invention. Further, Rosenberg does not provide a clear and sufficient disclosure with respect to the amounts to be used. For instance, Example 6 only provides: "Vitamin A was emulsified in whey protein concentrates having 35-80% protein or in whey protein concentrate. Wall solids concentrations were from 10-40% (w/w). Core of vitamin A to wall solids ratio was from 10-75%." The Examiner reads this to mean "a composition comprising 10-75% vitamin A and

35-80% whey protein," which naturally cannot be an "intimate" mixture like the present invention.

Additionally, Rosenberg does not disclose, teach or suggest enhancing bioavailability of core materials with whey protein, but teaches using whey protein as a microencapsulating agent for easy handling and storage of core materials. Focused on increasing bioavailability of the LBC, the present invention is directed to an invention different from Rosenberg and is not anticipated or rendered obvious to the skilled artisan familiar with Rosenberg. Therefore, this claim rejection should be withdrawn.

Claim Rejections -- 35 U.S.C. § 103

Claims 1-16 and 18-21 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Potter and/or Fujiwara. Potter teaches pharmaceutical/supplemental compositions comprising daidzein, soy whey protein, and vitamins that can be effective in decreasing LDL and increasing HDL. Fujiwara teaches a pharmaceutical composition comprising lycopene, soybean oil, and vitamin E, and also teaches that the composition is effective in decreasing LDL and increasing HDL. Although the references do not teach a composition comprising lycopene, soy extract and whey protein, the Examiner concludes that the invention as a whole is *prima facie* obvious over the references, because it would have been obvious to one of ordinary skill in the art at the time of the invention to combine the instant ingredients since each is well known to decrease LDL and increase HDL.

It appears, however, that the Examiner is making an *ex post facto* analysis with little relevance to the present invention. Lipophilic bioactive compounds are known in the art to be used in food or pharmaceutical compositions, but they are very often not bioavailable, particularly in the case of lycopene. The aim of the present invention is to increase bioavailability of the LBC, and the inventive step of the present application is not made obvious by Potter or Fujiwara. In fact, a skilled artisan trying to solve the problem of bioavailability of the LBC is unlikely to look into Potter and Fujiwara, as these references do not even discuss whey protein and bioavailability. Accordingly, this claim rejection is inappropriate and should be withdrawn.

The Examiner also rejects claims 1-16 and 18-21 under § 103(a) as being unpatentable over Schmitz, which teaches food product compositions comprising lycopene, vitamins C and E, whey protein, flavors and colors, in the form of solid, gel or liquid. While Schmitz does not

teach the composition comprising specific amounts and ratios of LBC and whey protein, or wherein the composition is in the claimed food forms, the Examiner states that it would have been well within the purview of one of ordinary skill in the art to optimize such amounts and forms as a matter of routine experimentation. The Examiner further states that, at the time of the claimed invention, one of ordinary skill in the art would have been motivated by routine practice to optimize the various parameters of the Schmitz composition with a reasonable expectation for successfully obtaining a food product.

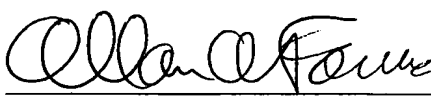
As stated above, however, the Schmitz composition is in an encapsulated form and therefore is heterogeneous, whereas the composition of the present invention is a homogenous mixture. In contrast to the Schmitz composition, the LBC is distributed uniformly in the protein matrix/network in the present invention. One of ordinary skill in the art would only know to use a lipid-containing core under Schmitz, as it specifies that the antioxidants are preferably localized in a lipid-based carrier within the food product to promote absorption and digestion of the carotenoid blend and does not disclose, teach or suggest that the lipid core may be eliminated and replaced with whey protein as a matrix. Schmitz, moreover, does not provide any information about enhancing bioavailability of the carotenoid blend, but contemplates using whey protein merely as carrier.

Because the Schmitz composition is presented in a form that is completely different from, and is not interchangeable with, that of the present invention and makes no mention or suggestion of enhancing bioavailability, one of ordinary skill in the art would have no motivation to experiment to optimize the parameters of the Schmitz composition to arrive at the presently claimed compositions. Thus, this § 103(a) rejection should also be withdrawn.

In view of the foregoing, it is believed that the entire application is now in condition for allowance, early notification of such would be appreciated. Should the Examiner not agree, a personal or telephonic interview is respectfully requested to discuss any remaining issues in order to expedite the eventual allowance of the claims.

Respectfully submitted,

Date 12/11/03



30,256

Allan A. Fanucci (Reg. No.)

WINSTON & STRAWN LLP
CUSTOMER NO. 28765
(212) 294-3311